



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application S. N. 09/581,887

Filed June 19, 2000

Inventor Wobben

For METHOD OF OPERATING WIND POWER INSTALLATION AND A WIND
POWER INSTALLATION

Group Art Unit 2834

Examiner Ponomarenko

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DECLARATION UNDER 37 CFR 1.132

Sir:

I, *Stefan Hartge*, hereby make the following declaration in support of the above-identified patent application.

1. My address is *Dreekamp 5, 26605 Aurich, Germany*.
2. I am an *electrical engineer* and I am employed by *Wobben Research & Development GmbH* as a *design engineer*.
3. I have a degree in *electrical engineering* from the *University of Applied Sciences at Karlsruhe*.
4. I have 3 years of experience in the field of power equipment and more particularly, in the field of wind turbines.

5. I have reviewed the subject application and I am familiar with the system described therein and its improvements to the state of art of wind turbine.
6. Generally speaking wind turbine can be used independently as a source of electrical power that is separate and disconnected from a standard power distribution. In this arrangement, the power from the turbine is fed to the load either directly, or the power is saved in a power storage device. Alternatively, a wind turbine may be used to feed power into a standard power grid. Systems of this type are disclosed in many references, including U. S. Patents Nos. 4,695,736; 5,083,039 and 6,137,187. The fact that the earliest of these patents was filed in 1985 illustrates that feeding power from a wind turbine into a power grid is a well established concept by now.
7. U. S. Patent No. 4,695,736 is particularly instructive because it illustrates a variable speed turbine feeding power to a power grid and including a plurality of blades 16 that are rotated by wind. The blades drive an AC generator 10 that generates power at a variable frequency. This power is fed a frequency converter 30 which then feeds power at a fixed frequency and voltage to a power grid 34. Importantly, as illustrated in Figs. 1 and 5 the generated power is sensed by a sensor 54 and used in a standard negative feedback circuit to control the speed of rotation of the blades, for example by changing the blades' pitch, as illustrated in Fig. 1. In addition, this patent also shows how the sensed power output of the AC generator 22 and the sensed speed of the turbine can be used to control the output of the frequency converter 20. It is well known in the field of electrical engineering that the power generated by an AC generator is sensed by determining the output voltage of the AC generator, and the corresponding

current flowing to the load, and then calculating the product of this voltage and current. In other words, sensing of generated power frequently includes a voltage sensing. A further point to note from this reference is that a schedule or look table 58 (Fig. 2 and 4) is used to relate the sensed power and the sensed speed to an corresponding output parameter. This output parameter is then used to control the output power of the frequency converter 30.

8. U. S. Patent No. 5,083,039 discloses another control circuit used to control the output power of a wind turbine by changing the pitch of its blades.
9. Of course, it is well known in the art that there are many other ways of controlling the output of a wind turbine, including changing the azimuth of the axis of rotation of the blades, as discussed in U. S. Patent No. 6,137,187. Other parameters that may be changed include *excitation*, *compensation*.
10. I have reviewed the specification for the subject application and it is clear that the specification describes a new wind turbine adapted to feed power to a standard power grid, as illustrated in Fig. 1. Moreover, Figs. 2, 4 and 5 and the specification describe that in the subject wind turbine, the voltage of the power grid is used as a control parameter, Fig. 3 shows the preferred relationship between the turbine output power and the grid voltage. Therefore, it is clear to me that the invention can be readily implemented by modifying the control circuitry of well known wind turbines, such as the ones described in the U. S. patents referenced above by incorporating therein the control circuits shown in Figs. 2 and 4. For example, the wind turbine of U. S. Patent No. 4,695,736 could be modified by changing the control circuitry of Fig. 1 as shown in the attached

SKETCH X. In this sketch a voltage sensor U has been added to sense the grid voltage G. This parameter is fed to the turbine controller 36 (I/O 40). In addition, a table T is stored in ROM 44 relating the wind power WP fed from frequency converter 30 to the grid as a function of the grid voltage G. The operation of the CPU 38 is then modified accordingly. Of course, sketch X is only exemplary and illustrates how almost any conventional wind turbine can be modified to perform the methodology described in the subject application.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Stephen H. Hays

28/11/02
Date